9. Notes on the Moa-bones in the New Zealand Exhibition of 1865. By James Hector, M.D., F.G.S., Director of the Geological Survey of New Zealand*.

In a collection of the natural resources and curiosities of New Zealand like that recently gathered together in the Exhibition which has just closed, as might be expected, the large wingless birds which once were so abundant in these islands were well represented by numerous specimens of their remains. Still, considering the profusion of Moa-bones which not only occur imbedded in the alluvial soil, but in parts of the country actually lie strewn on the surface, it is to be regretted that a more systematic search is not conducted by settlers and others possessing the necessary facilities, in order not only to obtain more perfect sets of the bones of the skeleton, but also, by amassing a large number of specimens from various districts, to afford a means of determining how many distinct kinds of these interesting birds existed. No extensive collection has ever, so far as the writer is aware, been made since that by Mr. Walter Mantell, which formed the basis for the admirable series of monographs on the structure of these birds by Professor Owen. Many fragmentary collections have doubtless been sent by private hands; but little or nothing has been added to our knowledge on the subject, with the exception of that which, I suppose, has been derived from the study of a remarkably fresh skeleton, which was sent from this province in the beginning of last year to the York Museum, and which has since been described by Mr. Allis in the 'Journal of the Linnean Society,' and by Prof. Owen in the 'Transactions of the Zoological Society.' This specimen is chiefly remarkable from being the first instance where any part of the integument or ligaments still remained attached to the skeleton†.

The following notes and the measurements of the various Moa-bones in the Exhibition are intended to direct attention to the subject, and to show the immense variety of those interesting remains which might be collected without an effort, if their true value to science were only properly known and appreciated.

List of the various collections of Moa-bones in the New Zealand Exhibition at Dunedin, 1865.

In the Otago Museum:—

1. Complete (or nearly so) skeleton of *Dinornis casuarinus*, set up by the writer. This skeleton stands about 5 feet 8 inches in height. The head is from a different locality, and may belong to a different species. The rest of the bones were all found together in relative position in digging in the Botanic Gardens in Dunedin. The bones were imbedded in a deposit of "Vivianite," or phosphate of iron, derived from their decomposition in contact with ferruginous waters. It is extremely common to find the cells in Moa-bones filled with crystals of this mineral.

2. A complete set of leg- and foot-bones of *D. giganteus*, exhibited

* Communicated to the Society by Mr. W. H. Flower, F.R.S., F.Z.S.

† See Mr. Dallas's paper *antea*, p. 265.

by Mr. Payne. This specimen was restored by the writer, and measured when together 6 feet 2 inches, the length of the tibia being $35\frac{1}{2}$ inches. It formed one of the most striking objects in the museum part of the Exhibition. It was found in alluvial soil at Ommaru; and it is not improbable that the rest of the skeleton might be found if searched for.

3. The three heads of *Dinornis ingens*(?), figures of which are enclosed, were exhibited by Mr. Coates of the gold-fields department. They were found in digging a ditch in alluvial soil. They were accompanied by imperfect skeletons of at least three different birds.

4. A large collection of bones, principally tarso-metatarsals, from marine ovens on the sandhills along the coast, where they are mixed with bones of Seals and fish and with native implements of chert, hornstone, and nephrite.

5. Collections of bones from different parts of the interior, where they lie on the surface or are imbedded in shallow alluvial deposits. Either collected by the writer, or contributed by the settlers and persons on the gold-fields. Among them is a splendid pelvis of *D. giganteus*.

6. Case of bones containing three heads, collected by F. Fenwick, Esq.; also a number of fragments of egg-shells and small leg-bones of *D. ingens*.

7. The gold-fields department exhibited a collection of very fine bones of *D. ingens* from the Wahatepu Lake.

8. In the Canterbury collections exhibited by Dr. Haast there were some fine bones of the following species, according to the catalogue :—*D. robustus, didiformis, elephantopus, casuarinus, struthioides,* and *Palapteryx ingens*. These were principally leg-bones, one sternum, and some vertebræ. Among the latter there is one unique specimen in which the crushed vertebræ are intermixed with smooth pebbles of quartz of the size of large beans, and which must, from their position, have been within the body of the animal, thus proving these smooth pebbles, that are so frequently found with Moa-bones, to be really "crop-stones," as has been conjectured.

9. The only other collection of Moa-bones in the Exhibition was that of M. Colenso from Hawkes Bay, being the only Moa-bones shown from the north island. They were very fine specimens of leg-bones, apparently of *D. ingens*.

10. One of the most curious objects of natural history in the Exhibition was a nearly complete Moa's egg, which was found in a cave in the Waizon valley, in the province of Marlborough. This egg was found resting in the hands of the skeleton of a native, who, according to the usual custom, had been interred in a sitting posture. It measures $9\frac{1}{2}$ inches in length and 7 in breadth, and is complete, all but a few fragments a little over an inch in diameter, which have been broken from one side. The fragments have, however, been preserved and are shown along with the egg; and, from the manner in which the egg is placed, the fracture cannot be perceived.

Fragments of Moa's eggs are frequently found in various parts of the country, and Mr. Mantell satisfied himself that they must have been used as food by the natives. He inferred this from finding

that the fragments towards one end of the shell were scorched when they were found in the native cooking-ovens, which correspond to the "kitchen-middens" of Europe. His inference, therefore, receives remarkable confirmation from the manner in which this perfect specimen of the egg has been found.

In order to approximate to the number of species represented in these different collections, the following table has been constructed to show the comparative measurements of the principal bones.

As the species have been determined only from the scale of measurements given in Owen's Monograph, the nomenclature is not to be implicitly relied on.

	No. of specimens.	Length of bone.	Girth, proximal.	Girth of middle.	Girth, distal.	Species.
		in.	in.	in.	in.	
Femur.	1	16	16	7·5	18	*D. giganteus.*
,,	11	7·5	8·5	4·5	10·5	*D. didiformis.*
,,	1	9	9	5·7	11·3	*D. dromioides.*
,,	13	9·5	9·7	4·7	10·5	
,,	2	14	16·5	7	14	*D. ingens.*
,,	1	14	16	7	14	
,,	3	12·5	15	7·5	15·5	
,,	2	11	13·3	6·7	14	*D. crassus.*
,,	9	10·3	10·5	5·3	12·2	*D. struthioides.*
,,	1	11	12	5·5	12·5	
,,	1	6	...	2·5	...	*D. curtus.*
Tibia.	1	28·5	13·7	5·7	13	*D. ingens*, var. *robustus.*
,,	1	28	15·5	6·5	13·5	
,,	1	29·5	19·5	4·5	12	
,,	2	29	18	6	13·5	
,,	1	21	...	...	...	*D. dromioides.*
,,	1	20·5	...	...	...	
,,	1	35·5	16	7·7	...	*D. giganteus.*
,,	1	33	17	7	12·7	
,,	2	17·5	13	4·3	10	*D. casuarinus.*
,,	5	16·5	12·7	4·3	8·2	
,,	1	15·7	11	5·5	14	*D. struthioides.*
,,	1	19	12·5	5	...	
,,	1	13·5	9·5	5	12·5	
,,	1	13	6	2·3	4·5	*D. curtus.*
,,	1	...	11	2·3	...	
Tar.-metatar.	1	18·5	...	...	...	*D. giganteus.*
,,	1	19	12	6	15	
,,	1	18·5	12	6	15	
,,	1	15	..	...	...	
,,	4	16·3	11·5	5·7	13·3	*D. ingens* (?)*.
,,	14	12	10·5	5	11·5	*D. struthioides*(?).
,,	6	7·75	8	4·8	10	*D. casuarinus.*
,,	1	7·5	8	4	8	
,,	1	7·3	8·5	4·5	10	
,,	1	7·7	...	...	...	
,,	2	8	8·5	4·5	10	
,,	3	8·5	9·5	5·3	11·5	*D. crassus.*
,,	1	9·5	10·5	5·8	13	(?)
,,	2	10·5	11	5	12·5	(?)
,,	2	11	13	6·5	14·5	(?)
,,	2	10	10·5	2·7	10·7	*D. curtus* (?).

* These four are along with tibiæ of *D. ingens*; otherwise they would agree better with *D. giganteus.*